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ABSTRACT

The purpose of this paper is to study flows into the pool of medical manpower in Michigan to develop guidelines for medical manpower policies. Assuming the goals were to maximize the number of physicians in Michigan, this paper describes an approach that would show the consequences of different allocations of state funds for achieving these objectives. It is granted that the ultimate goal, rather than maximizing the number of doctors, would be to achieve the highest possible health status for Michigan residents attainable with given resources. To properly evaluate the means to achieve this ultimate goal it is necessary to compare the impact of state funds devoted to increasing the pool of physicians to that of alternative state health and nonhealth expenditures that effect health status. Furthermore, enlarging the pool of physicians is only one of several ways of increasing the availability of health services that, in turn, represents only one approach to improving health status. These qualifications notwithstanding, this study is restricted to the analysis of alternative flows of medical manpower with associate cost implications for the state. Focusing on alternative flows of doctors into and out of Michigan, a framework will be provided for suggesting implications of different ways of state funding of the supply of physician manpower. (Author)

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INCREASING THE SUPPLY OF PHYSICIANS - ALTERNATIVE SOURCES FOR A STATE,

by Irene Butter
and
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FINANCING THE FLOW OF PHYSICIAN MANPOWER

I. INTRODUCTION

The purpose of this paper is to study flows into the pool of medical manpower in Michigan in order to develop guidelines for medical manpower policies. Assuming the goal were to maximize the number of physicians in Michigan, this paper will describe an approach which would show the consequences of different allocations of State funds for achieving this objective. It is granted that the ultimate goal, rather than maximizing the number of doctors, would be to achieve the highest possible health status for Michigan residents attainable with given resources. To properly evaluate the means to achieve this ultimate goal it would be necessary to compare the impact of State funds devoted to increasing the pool of physicians to that of alternative State health and non-health expenditures which effect health status. Furthermore, enlarging the pool of physicians is only one of several ways of increasing the availability of health services which in turn represents only one approach to improving health status. These qualifications notwithstanding, this study will be restricted to the analysis of alternative flows of medical manpower with associated cost implications for the State. Focusing on alternative flows of doctors into and out of Michigan a framework will be provided for suggesting implications of different ways of State funding of the supply of physician manpower.

II. SOURCES OF SUPPLY OF PHYSICIANS IN MICHIGAN

The stock of active physicians in Michigan changes according to the number of physicians entering medical practice in the State and the number of active physicians who leave the state or the profession through migration, retirement or death. It is possible to identify four flows which feed into the medical manpower pool and one flow which drains it. Figure 1 identifies the sources and principle pathways or flows into the pool of physician manpower. The three sources are shown at the top: 1) Michigan Medical School Graduates (MMGs); 2) Graduates from Out-Of-State U. S. Medical Schools (OSGs); and 3) Graduates from Foreign Medical Schools (FMGs). The principle pathways or flows are as follows:

Flow 1 consists exclusively of MMGs who become in-state interns, then in-state residents and then members of the Michigan pool of physicians;

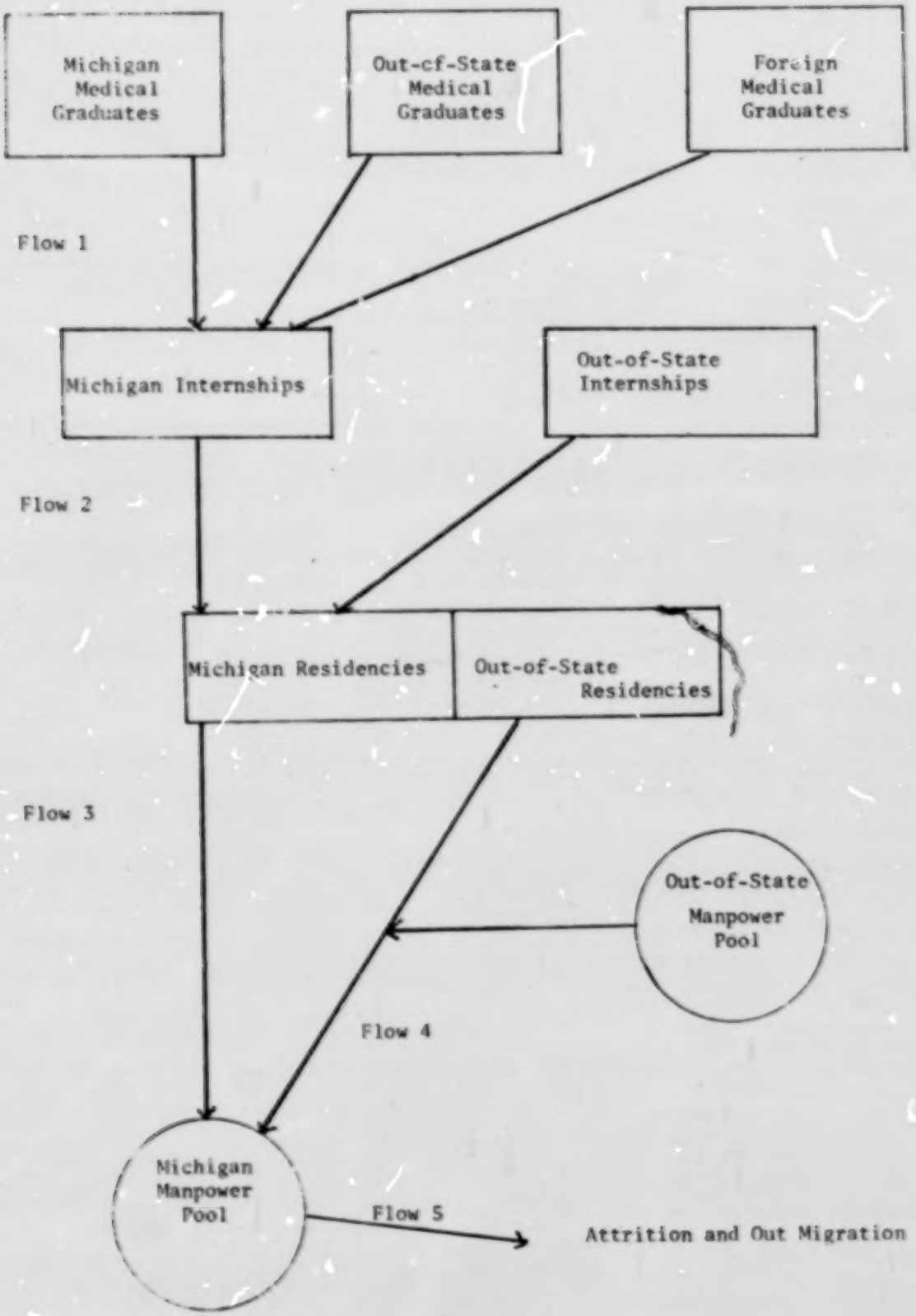
Flow 2 draws graduates from sources 1, 2, and 3 into in-state internships, who become in-state residents and subsequently members of the Michigan pool of physicians;

Flow 3 consists of in-state residents who could have served internships either inside or outside the State, and draws on sources 1, 2, and 3;

Flow 4 also draws on each of the 3 sources and consists of medical graduates who served residencies outside the State as well as fullfledged physicians who were practicing in other states, before they entered the Michigan pool of physicians.

FIGURE 1

PRINCIPAL SOURCES AND PATHWAYS INTO THE STOCK OF MICHIGAN PHYSICIAN MANPOWER



In contrast to lows 1, 2, 3, and 4, Flow 5 is an outflow which occurs when physicians leave their practice because of death or retirement, when they transfer out of the medical profession, or when they relocate for practice out of the state.

For the sake of simplicity the diagram concentrates on the principle inflows while it omits some of the possible outflows or counterflows. Naturally, sources 1, 2, and 3 can and do flow into out-of-state internships, out-of-state residencies, and out-of-state pools of physicians at any stage of their medical career. Some of the counterflows, or flows of medical graduates out of Michigan prior to their entry into the pool, will be discussed in later sections of this paper.

With respect to the assumed goal, e. g. maximizing the number of physicians in Michigan, the purpose of the diagram is to show that there are 3 major sources and 4 principal flows which should be considered by the State in achieving this goal. Essentially there are three processes which determine the size of the Michigan pool of physicians: production, retention, and in-migration of medical graduates. These three processes, more so than those that determine exodus from the pool are manipulatable by State policies.

We will now turn to an examination of production, retention, and in-migration of the four flows into the state. In doing so some obstacles will be encountered because of deficiencies in the existing data base and the data gaps will be pointed out. The final section of the paper will deal with goals and criteria for manipulation of flows.

FLOW 1

This is the flow of MMGs via Michigan internships and Michigan residencies into the Michigan medical manpower pool. MMGs are produced by the State's medical schools but after graduation they may or may not remain in the State for graduate training and/or for medical practice.

PRODUCTION:

Since 1971 there are four state-supported schools of Medicine and Osteopathy in Michigan which collectively enrolled that year 555 first year students (516 Medicine and 37 Osteopathy) and produced a total of 346 graduates, including the first crop of 31 graduates from the Michigan State Medical School. The Michigan State College of Osteopathy began to enroll students in 1971 and while it will not contribute to the production of graduates for another two years from now, 42 Osteopathic students have graduated this summer from the Pontiac School which is now extinct. The total number of first year enrollments in Michigan grew from 300 in 1963 to 656 in 1973 or 119%, while the total number of MMGs grew from 279 in 1963 to 401 in 1973 or 44%. (See Table 1)

TABLE 1

GROWTH OF FIRST YEAR ENROLLMENTS & GRADUATES OF MICHIGAN MEDICAL SCHOOLS
1963 - 1973

	First Year Enrollments			Graduates		
Schools	1963	1973	% Change	1963	1973	% Change
U of M	200	237	18.5%	169	205	21.3%
Wayne	100	256	156.0%	110	121	10.0%
M. S. U.	-	90	-	-	33	-
Osteo	-	73	-	-	42*	-
TOTAL	300	656	118.7%	279	401	43.8%

*Graduates of Pontiac College of Osteopathy now defunct. In operation is the M. S. U. College of Osteopathic Medicine.

Source: JAMA, Medical Education Numbers, and admissions offices of the schools.

Note: The information presented in the remainder of this paper pertains to medical graduates only, because we were unable to obtain comparable data for osteopathic graduates.

RETENTION:

Ideally one should be able to measure what portion of each cohort of MMGs is retained by the state at each phase of the post-graduate medical career. These retention rates, when available, can be used by the State to identify the points of leakage out of the flow of MMGs and the pathways with a strong likelihood of feeding the Michigan pool of physicians.

Information on internship choices of MMGs available for 1971, 1972, and 1973 only, indicates that the percentage of graduates staying in Michigan for internships rose from 42% in 1971 to 52% in 1973. Primarily the graduates of Wayne State Medical School are responsible for the

pro-Michigan shift in internship placement. Nevertheless, about 164 out of 340 MMGs left this year to receive internship training outside the State.

While it is encouraging to find that the Michigan State Medical Society began several years ago to compile information on internship placement of MMGs, it is regrettable that the same type of information is not available for residency choices of MMGs, those who intern in Michigan as well as those who serve internships elsewhere. Due to this data gap, the relationship between location of internship and location of residencies is as yet unknown.

Beyond the internship phase of the medical career of MMGs it is known that of all living graduates who had received degrees from Michigan Medical Schools through 1967, 52% were practicing in Michigan in 1967 and 48% or 4,222 MMGs had left the State for practice elsewhere. It is probably coincidental but still interesting to note that both the recent data on internship choices and the longer run data on location of all living MMGs in 1967 indicate a 52% retention rate.

FLOWS 2 AND 3

These are the flows from Michigan internships and Michigan residencies into the Michigan pool of doctors. Both flows draw graduates from all three sources (MMGs, OSGs, and FMGs) and Flow 2 includes Michigan and out-of-state interns as well. Again, it would be ideal if Flows 2 and 3 could be measured independently of one another, and if their interrelationships could be established. However, due to deficiencies in the data, Flows 2 and 3 must be measured jointly, and even then only partial measurement is feasible.

PRODUCTION:

The number of interns and residents filling positions in Michigan hospitals has grown from 2,008 in 1963 to 2,371 in 1971 or 18%. Filled internships increased from 414 in 1963 to 516 in 1971 showing a 25% growth, while filled residencies rose from 1,594 to 1,855 during the same period showing roughly 16% growth. Expansion in the volume of Michigan's internships and residencies during the last decade has been roughly proportional to expansion in the country at large. In terms of population size Michigan ranks seventh in the nation and in terms of filled internships and residencies its rank corresponds to that of population size.

Much remains unknown about the magnitude, origin and retention of Flows 2 and 3, both separately and combined. Though the total number of internships and residencies filled each year is known for the state, information on what portion of Flows 2 and 3 typically enter the Michigan physician pool and what portion of Flow 3 consists of in-state versus out-of-state interns is totally unavailable.

TABLE 2

GROWTH IN INTERNSHIPS & RESIDENCIES IN MICHIGAN, 1963-1971

	1963	1971	% Change
INTERNSHIPS			
Total Positions	583	677	+16%
Positions Filled	414	516	+25%
Fill Rate	71%	76%	+5%
RESIDENCIES			
Total Positions	1,912	2,225	+16%
Positions Filled	1,594	1,855	+16%
Fill Rate	83%	83%	0

Source: JAMA, Medical Education Numbers

IN-MIGRATION:

TABLE 3

FILLED INTERNSHIPS AND RESIDENCIES IN MICHIGAN, SELECTED YEARS

	1965		1968		1971	
Internships						
TOTAL	366	100%	407	100%	490	100%
MMGs	134	37%	157	39%	128	26%
OSMGs	119	33%	108	27%	134	27%
FMGs	113	31%	142	35%	228	47%
Residencies						
TOTAL	1,597	100%	1,678	100%	1,980	100%
MMGs	469	29%	416	25%	469	24%
OSMGs	448	28%	412	25%	499	25%
FMGs	680	43%	850	51%	1,012	51%

Source: JAMA, Medical Education Numbers

Note: Discrepancies between data shown in Tables 2 and 3 derive from the fact that they are different data sets, collected at different points in time.

Only about 1 out of 4 of the state's internships and residencies are filled by MMGs. Although the information set forth in Table 3 is incomplete, it appears that during the last decade the percentage of internships and residencies filled by MMGs and OSGs has been declining and the percentage filled by FMGs has been steadily increasing. (Throughout this paper the data for FMGs and Canadian MGs are lumped together.) Between 1965 and 1971 the number of FMGs in filled internships and residencies

increased from 793 to 1,240, and the percentage of total training positions filled by FMGs grew from 40% to 50%. This is high compared to the national FMG fill rate of about 33% for internships and residencies.

Migration of FMGs into internships and residencies, particularly in recent years, has been substantially larger than that of OSGs and has grown rapidly while that of OSGs and MMGs has been more or less steady. In 1971, a total of 1,873 non-Michigan medical graduates filled training positions in Michigan. Residencies, however, are often several years in duration and therefore the yearly in-migration into Flows 3 and 4 is overstated by the above number.

FLOW 4

This flow includes medical graduates who served out-of-state residencies as well as full fledged physicians drawn away from the medical manpower pools of other states. All three sources of medical graduates may be tapped by Flow 4.

Our ability to measure Flow 4 is even more limited than it is for the preceding flows. Flow 4 is composed of physicians who are either migrating into the state for the first time or they could have received undergraduate, internship or early residency training in Michigan and are returning to the state for medical practice. Inasmuch as there is presently no way of identifying whether these physicians are first time immigrants or returnees to the state, production and in-migration of Flow 4 are synonymous. Moreover, there is no information for the measurement of retention of Flow 4, and therefore the discussion of Flow 4 will focus primarily on in-migration.

IN-MIGRATION:

In-migration of Flow 4 is measurable at the present time only by inference from licensure statistics which are not ideally suited for this purpose because parts of Flows 2, 3, and 4 are merged in these statistics and cannot be identified separately. For example, the OSGs and the FMGs who receive their first license to practice in Michigan in any given year, most certainly include some who served either their internship and/or their residency outside of the state, but the precise number in that category is not revealed. The total number of first licenses granted in Michigan from 1966 to 1971 show fluctuations without a notable trend of growth.

TABLE 4

"FIRST-TIME" LICENSES GRANTED TO PHYSICIANS IN MICHIGAN

	Total Licenses Granted to New M.D.s	MMGs	OSMGs	FMGs	% Non-MMGs
1966	333	249	23	61	25%
1967	258	221	10	27	14%
1968	341	256	21	64	25%
1969	432	290	62	80	33%
1970	429	291	58	80	32%
1971	338	205	75	58	39%

Source: JAMA, Medical Licensure Numbers

The figures show a rise in the percentage of total new licenses granted to non-Michigan graduates, including OSGs and FMGs but it is not

possible to determine what portion of these served internships and/or residencies outside Michigan.

The statistics also show the number of licenses issued in Michigan by reciprocity and endorsement. In most cases these licenses are issued to physicians who were previously licensed in another state, and therefore most of these would be part of Flow 4. The number of licenses issued by reciprocity and endorsement from 1966-1971 also shows fluctuation along with some increase over time.

TABLE 5

LICENSES GRANTED IN MICHIGAN BY RECIPROCITY AND ENDORSEMENT

	Total Granted	MMGs	OSMGs	FMGs	% Non-MMGs
1966	236*	-	172	59	98%
1967	146	1	103	42	99%
1968	177	8	137	37	98%
1969	250	8	206	36	97%
1970	303	4	257	42	99%
1971	363	44	274	45	88%

*Includes 5 graduates of extinct or unapproved medical schools.

Source: JAMA, Medical Licensure Numbers

The majority of these licenses are granted to non-Michigan graduates and an unknown portion of these probably served out-of-state residencies or had started medical practice outside the state. However, until the career profiles of these immigrating physicians are studied in

detail, it is not possible to distinguish Flows 2, 3, and 4.

The statistics set forth in Tables 4 and 5 show that between 1966 and 1971 there was an average annual inflow of 103 initial licensees and 235 endorsed licensees, and both inflows consist of non-Michigan graduates. It is assumed that the majority of these non-Michigan graduates received the bulk of their graduate training outside of Michigan. Even though Michigan had little or no part in the production of these graduates, the state can influence the magnitude of Flow 4 through its licensure policies. For example, in 1972 Michigan eliminated citizenship as a requirement for licensure, and proceeded to issue 637 new licenses to FMGs in 1972 in comparison to an average annual number of 53 FMG new licenses between 1966 and 1971. This demonstrates that revision of state licensure policies as well as funding policies can have a decided impact on the size and perhaps the retention rate for some of the flows.

Of the total stock of physicians practicing in Michigan in 1967, 36% or nearly 4,000 were OSGs and 21% or nearly 2,400 were FMGs (including 480 Canadian Medical Graduates). Together these two groups of non-Michigan graduates constituted 57% of the state's medical manpower pool in 1967, and since this is a large portion of the total supply, it would be useful to determine how long these physician migrants have practiced in Michigan and at what stage of their professional careers they first entered.

FLOW 5

In contrast to Flows 1-4 which feed into the pool of physicians, Flow 5 is an outflow which drains the pool. It consists of emigrating, deceased, and retired physicians and includes medical graduates from each of the three sources.

It was stated earlier that of all living graduates who had received degrees from Michigan medical schools through 1967, 48% or 4,222 MMGs were practicing medicine outside Michigan. It would be useful if one could identify the most typical pathways or points of departure for the 4,222 MMGs who emigrated or whether these pathways have shifted over time. Licensure statistics, the only readily available data source on outflow, show that from 1966 to 1971 between 250 and 540 MMGs were licensed annually in other states. If out-of-state licensure is an adequate index of physician outflow, Michigan is experiencing an average annual loss of nearly 400 MMGs. Table 6 shows that most of these out-of-state licenses were issued to MMGs through reciprocity and endorsement, which might suggest that the MMGs leaving Michigan had already been licensed for practice here. Unfortunately, there is no information on age and stage of medical career of emigrating MMGs nor on those physicians migrating out of Michigan who are non-Michigan medical graduates.

TABLE 6

MMGs RECEIVING LICENSES IN OTHER STATES

	First Licenses	Reciprocity and Endorsement	Total MMGs Licensed Out-of-State
1966	11	234	245
1967	18	320	338
1968	18	402	420
1969	8	402	410
1970	25	410	435
1971	60	479	539

Source: JAMA, Medical Licensure Numbers.

Table 7 combines all the licensure statistics on inflow and outflow and shows that Michigan is a net importer of new licensees from out of state but a net exporter of MMGs licensed by reciprocity and endorsement.

TABLE 7

NET GAIN AND LOSS IN LICENSURE OF PHYSICIANS IN MICHIGAN

		1966	1967	1968	1969	1970	1971
New Licenses	MMGs Licensed O.O.S.*	11	18	18	8	25	60
	OSMGs & FMGs in Mich.	84	37	85	142	138	133
	Net	+73	+19	+67	+134	+113	+73
Licenses by Reciprocity and Endorsement	MMGs Licensed O.O.S.	234	320	402	402	410	479
	OSMGs & FMGs in Mich.	231	145	174	242	299	319
	Net	-3	-175	-228	-160	-111	-160
Total Licenses	MMGs Licensed O.O.S.	245	338	420	410	435	539
	OSMGs & FMGs in Mich.	315	182	259	384	437	452
	Net	+70	-156	-161	-26	+2	-87

*O.O.S. = Out of State

Source: JAMA, Medical Licensure Numbers

Flow 5, in addition to outflow, also includes losses to the physician pool through deaths and retirements. This is generally assumed to be about 2% per year of the total pool.

III. SUMMARY AND CONCLUSIONS

The main purpose of this paper is to show that once manpower goals have been set, it is possible to manipulate the four flows into the Medical Manpower Pool through selection of appropriate state policies. We are aware that in addition to numbers being one possible goal, geographic and specialty distribution must also be considered to meet the needs of Michigan residents, and we plan to expand our approach to include these additional goals. But for the moment let us assume that the goal is to maximize inflow into the pool at least cost to the state. Accordingly, state funds should be allocated to the flows which offer a unit of retained medical manpower at lowest cost. Thus a 52% retention rate of MMGs implies that the cost to the state per retained physician is almost two times the cost to the state of producing a medical school graduate. The cost to the state of a retained MMG must be compared to the potential cost to the state of a retained intern, resident, or immigrant physician before an optimal allocation of state funds can be designed and geared to the stated goal.

Once it becomes possible to compare retention rates of Flows 1, 2, and 3 together with the actual cost to the state of undergraduate education and the potential cost of graduate education, questions may be raised concerning trade offs in state funding of these two levels of medical education. Why should undergraduate medical education of emigrating MMGs be subsidized by the state when ostensibly the reason for their subsidy is to increase the pool of physicians in Michigan?

If emigrating MMGs were required to repay their subsidy, it would either lower the cost to the state, it would allow the diversion of funds into other flows of medical manpower, or it might serve as an incentive for MMGs to pursue medical practice in Michigan.

Flow 4 does not absorb state education funds, but can be influenced through provision of incentives to attract out-of-state physicians into Michigan. The revision of licensure policy for FMGs is an example of removal of a restrictive barrier, likely to result in expansion of Flows 2, 3, and 4 and probably without costs to the state. Another strategy for increasing Flows 3 and 4 might consist of financial incentives such as income tax rebates and relocation subsidies for physicians migrating into Michigan. Here the state would incur costs in terms of foregone tax contributions and possibly recruitment costs and/or moving and relocation allowances.

The size and composition of Flows 2 and 3 during the last decade suggest that during an era of expanding federal health care programs as well as a rapidly growing private demand for physician services, FMGs filled an important gap in the supply of Michigan manpower. One can only speculate about the medical manpower situation in Michigan during the late 60's if the rapid and relatively inexpensive inflow of FMGs could not have been accomplished. In the event that national health insurance becomes a reality during the present decade, the State would be well advised to provide equitable treatment and opportunities for advancement to the foreign component of its physician pool. For even if FMGs are not the most preferred additions to the

medical profession, they may represent the quickest and the lowest cost response to meeting health care demands of Michigan residents.

In summary, this framework suggests alternative approaches for the state in achieving physician manpower objectives. It is hoped that the data gaps on magnitude, retention, and costs of flows which have been indicated throughout this paper will be filled in the future, in order to facilitate better choices. Hopefully this paper has focused the discussion of financing medical manpower onto the objectives and criteria that should be considered.

APPENDIX I

As a result of our joint discussions in October, we submit the enclosed draft of a proposed first step in setting up an information system on Michigan Medical Manpower. While this data system will not provide answers to all the questions that have been posed, it is recommended on grounds of its simplicity and relatively low cost. If the data contained in the proposed system can be up-dated each year, the size, origin and retention of the different flows into the Michigan Medical Manpower pool will be indicated over time. Special studies on the longitudinal patterns of graduating classes of Michigan Medical Schools will be more complex, more costly and will have a longer lead time. These studies, if considered desirable, can be designed separately.

Assuming that an AMA tape for the State of Michigan with reliable data on Internships and Residencies can be obtained for each year, it should be possible to document the size and origin of different flows into the pool of physicians in Michigan as follows:

1) Of the current stock of practicing MDs in Michigan

   a) How many came from Michigan Medical Schools, by school and by year of graduation

   b) How many came from Michigan Medical Schools and served Internships and/or Residencies in Michigan

   c) How many are graduates of out of state medical schools and served Internships and/or Residencies in Michigan

   d) How many are FMGs and served Internships and/or Residencies in Michigan

   e) How many are out of state graduates or FMGs and served neither Internships nor Residencies in Michigan

Illustrative Table (yr. _____)

Practicing MDs in Michigan by
Location of Medical School and Graduate Training

	No Mich. I & R	Mich. I Only	Mich. R Only	Mich. I & R	Total Number	% of Total Pool
U. of M.	20	100	100	300	520	--
Wayne S.						
MSU	—	—	—	—	—	—
TOTAL MICH. GRADS						
OOSGs						
FMGs	—	—	—	—	—	—
TOTAL						

2) To determine trends of the different flows into the Michigan Medical Manpower Pool, each year's new inflow can be categorized as shown in the above table, and changes in the relative sizes of the flows can be observed.

3) Retention rates of the different flows into the Michigan Pool a-e could be calculated using as a base a) year of medical school graduation and size of graduating class or a group of years; and b) the total number of I's and R's in Michigan in a given year. Thus it would be possible to relate the number of practicing physicians in Michigan to year of medical school graduation and to year of residency. For example, if of 100 Residents in Michigan in 1971, 10 are found practicing in Michigan in 1972, the retention rate would be the number of 1971 Residents practicing in Michigan in 1972 (10) as a percentage of total Residents in 1971 (100) minus those that are still serving residencies in Michigan in 1972 (80). (It will be necessary to determine how many Michigan Residents in 1972 were Residents in Michigan in 1971.) These retention rates will be calculated each year and over a series of years the retention of the flow of Michigan Residencies into the Michigan pool will be approximated for each category of medical school graduates.

Illustrative Table (yr. ____)

Retention of Different Flows Into Michigan Manpower Pool

	In Mich. Rs in 1971	1971 Rs In Mich. in 1972	1971 Rs Practicing in Mich. in 1972	1971 Rs Practicing Out-of-State in 1972	Retention
U. of M.	100	80	10	10	10 ÷ (100-80) = .5
Wayne State					
M.S.U.	—	—	—	—	
TOTAL MICH. MEDICAL GRADUATES					
OOSGs					
FMGs	—	—	—	—	
TOTAL					